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ABSTRACT

The study explores the relative effects of a wide range of variables that influence learning, and whether three methods--content analysis, expert ratings, and meta-analysis--agree on whether and how strongly these variables influence learning, using the educational research literature and an expert survey. The presence of an emergent knowledge base for school learning was also investigated. A framework was developed to guide the study that incorporated the following theoretical constructs: (1) state and district governance and organization; (2) home and community educational contexts; (3) school demographics, culture, climate, policies, and practices; (4) design and delivery of curriculum and instruction; (5) classroom practices; and (6) student characteristics. Data from 179 handbook chapters (narrative reviews) were used for the content analysis, and a survey of 61 educational researchers provided expert ratings. Meta-analysis was conducted with 91 studies. The magnitude of the correlation between the meta-analyses and the narrative reviews suggests an emergent knowledge base on school learning. The moderate correlation of expert ratings with the results from meta-analysis and narrative reviews also supports an emergent knowledge base on influences on learning. Three appendixes provide technical information on the narrative reviews and expert survey and a list of the 91 sources used in the meta-analysis. (Contains 1 figure, 4 tables, and 119 references.) (SLD)

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ED 399 311

Toward a Knowledge Base for School Learning

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The National Center on Education in the Inner Cities

U.S. DEPARTMENT OF EDUCATION
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During the 1980s, two developments occurred that altered the way educators and researchers thought about teaching and learning: (1) a burst of educational reform which ushered in innovative programs and practices and (2) the creation of new research tools to evaluate the effectiveness of school interventions. The mediocre performance of the nation's students and the increased number of at-risk children and families spurred government, business, educators, and the public to rethink many aspects of schooling. Reform efforts included, for example, school restructuring, statewide academic standards, and the implementation of new assessment methods. Although many of these innovative practices have been in place for almost a decade, their long-term impact has not been established. As researchers begin to study the impact of these reforms, they have new tools to determine which programs, practices, and contexts produce the most robust and generalizable results. These tools are demonstrating that, in fact, some educational practices and programs work far better than others.

This paper has three purposes: (1) to identify the relative effects of a wide range of variables that influence learning, (2) to determine whether three different methods of analysis--content analyses, expert ratings, and meta-analyses--agree on whether and how strongly these variables influence learning, and (3) to address the presence of a knowledge base underlying learning.

THE 1980S: AN ERA OF SCHOOL REFORM

In the United States, many sociological and educational trends have converged to create a climate of educational reform. With the release of A Nation at Risk (National Commission for Excellence in Education, 1983) and A Nation Prepared: Teachers for the 21st Century (Carnegie Forum on Education and the Economy, 1986), the public became aware of the mediocre performance of the nation's schools and the inadequacies of the teaching corps. The poor performance of the United States' students, when compared to their international counterparts (Stevenson, 1983; Stevenson, Lee, & Stigler, 1986), generated concern among business and civic leaders that the nation's graduates would be ill-equipped to deal with the demands of a global economy.

Accompanying the glum reports on the nation's educational system, was news of an increase in the number of at-risk students. Demographic reports provided evidence of U.S. families beset by urgent problems including poverty, teenage pregnancies, single-parent households, substance abuse, limited health care, and inadequate and unaffordable housing (Levy & Copple, 1989). These demographic trends point to the need for better education and social and health services in order to break the cycle of disadvantage facing at-risk students and their families (Schorr, 1989).

Educators responded to the news of poor results and increasing numbers of at-risk children by restructuring schools, increasing standards for students and teachers, and developing a variety of innovative programs. The 1980s became an era of school reform during which most of the 50 states and many local districts participated in educational reform and improvement programs.

Many professional education organizations provided leadership in reforming the nation's schools. The National Governors Association, a pioneer in school restructuring, recommended fundamental changes in curriculum, instruction, and the patterns of decision making and accountability used in our nation's schools. Professional organizations for teachers, such as the National Science Teachers Association and the National Council of Teachers of Mathematics, issued new standards for students' academic performance coupled with recommendations for assessing higher order thought processes, as well as factual recall. These same organizations also set standards for the performance of teachers (National Council of Teachers of Mathematics, 1989; National Science Teachers Association, 1989).

Innovative programs and schools also demonstrated new directions for educational reform. The widely recognized programs include, for example: Comer's School Development Program (Comer, Haynes, & Hamilton-Lee, 1988), Levin's Accelerated Schools Project (Levin, 1988), RJR Nabisco's Next Century Schools (House Committee on Education and Labor, 1990), the Saturn School of Tomorrow (Norris, 1991), Sizer's Coalition of Essential Schools (Sizer, 1992) and Wang's Adaptive Learning Environments Model (Wang & Zollers, 1990).

The programs developed by Comer, Levin, Sizer, Wang and others have focused on serving at-risk student populations. New attitudes toward students with special needs, curricular innovations, and new instructional strategies are among the key characteristics of these programs. New attitudes toward student diversity are reflected by recognizing students' prior knowledge, emphasizing strength-building rather than remediation, and distinguishing between cultural differences and deficits. Curricular innovations include focusing on complex, real-life problems; embedding basic skills instruction within these problems; and relating new content to students' prior knowledge and cultural background. New instructional strategies include modeling powerful thinking strategies, scaffolding complex tasks, employing reciprocal teaching, and using a variety of instructional approaches (Means & Knapp, 1991; Reynolds, 1989; Wang, Reynolds, & Walberg, 1986; Williams, Richmond, & Mason, 1986).

Reports of students' poor performance also led to AMERICA 2000, the first federally initiated reform of U.S. schools (U.S. Department of Education, 1991). AMERICA 2000: An Education Strategy was built around six national goals agreed upon by the 50 governors to increase the achievement of U.S. students. AMERICA 2000 has four tracks designed to promote educational excellence by improved accountability, new technology, lifelong learning, and greater parental and community involvement. The AMERICA 2000 program was adopted by all 50 states and implemented in thousands of communities across the United States.

Professional education organizations; federal, state, and local governments; the business community; and the public all participated in the reform efforts of the 1980s. Although some of the new programs and practices of the 1980s were supported by research findings, few of these innovations have shown replicable long-term impact on students. Kirst (1991) addressed the lack of long-term studies, saying,

"The paucity of longitudinal experiments and demonstrations has resulted in an overabundance of 'snapshots,' studies of specific treatments and interventions, without a systematic knowledge base established over time and under varying circumstances" (p. 38). This paper is an attempt to begin to cull, from theory, empirical results, and expert judgements, a systematic knowledge base of school learning.

NEW RESEARCH TOOLS: THE ADVENT OF META-ANALYSIS

For nearly a century, educational researchers have examined the teaching and learning process (Walberg & Haertel, 1992). They have employed four basic types of research studies, including: (1) primary research analyzing original qualitative and quantitative data, (2) secondary analyses of original data, (3) narrative commentaries describing and critiquing studies without quantitatively summarizing them, and (4) research syntheses and meta-analyses quantitatively summarizing results of studies.

Since the turn of the century, tens of thousands of primary research studies have been conducted focusing on teaching and learning. Traditionally, the results of these primary studies have been summarized in narrative reviews. Two examples of narrative reviews that have influenced school reform are What Works, a compendium of educational research results that was widely disseminated by the United States Department of Education (1986), and the effective schools literature that featured lists of school characteristics associated with high academic performance (Brookover, 1979; Brookover & Lezotte 1977; Purkey & Smith, 1983; Rutter, Maughan, Mortimore, Ouston, & Smith, 1979).

Prior to the late 1970s, researchers lacked the statistical methods needed to conduct research syntheses and meta-analyses. Once the necessary statistical methods were developed, researchers were able to draw powerful conclusions based on dozens of comparable studies that were conducted over decades. Cook et al. (1992) describe the use of meta-analytic techniques for synthesizing particular literatures. They characterize meta-analysis as "...a set of quantitative techniques that permit synthesizing results of many types of research, including opinion surveys, correlational studies, experimental and quasi-experimental studies, and regression analyses probing causal models" (p. 4). Cook et al. (1992) provide examples of how meta-analysis can answer a wide range of research questions such as, why some marital therapies are more effective than others, why some intervention programs for juvenile offenders achieve better results than others, and why gender differences in science achievement exist.

Meta-analyses (or quantitative research syntheses) employed in the late 1970s and 1980s demonstrated the consistency of educational effects and placed teaching and learning on a more scientific basis (Gage, 1978; Glass, McGaw, & Smith, 1981; Walberg, 1986). Since the late 1970s, the number of meta-analyses and research syntheses has grown dramatically. Cook et al. (1992) cite Guzzo, Jackson, and Katzell (1987), who reported that in the past decade the number of articles and reports indexed in PsychINFO under the term "meta-analysis" has grown steadily. In 1985 alone, nearly 100 meta-analyses were indexed.

Meta-analyses have been used to determine the effects of particular programs, contexts, and instructional practices on learning. Researchers, for example, quantitatively summarized the effects of school programs, such as cooperative learning and mastery learning (Johnson, Maruyama, Johnson, Nelson, & Skon, 1981; Guskey & Gates, 1986). Others synthesized the effects of particular learning contexts such as the home environment (Iverson & Walberg, 1982) and particular instructional practices, such as homework (Paschal, Weinstein, & Walberg, 1984). While each of these research syntheses and meta-analyses provided evidence of robust and generalizable findings concerning particular programs, contexts, or instructional practices, they did not provide information on the relative importance of the range of variables that impact learning. This paper compiles evidence about particular programs, contexts, and instructional practices, as well as other influences on school learning, and compares their relative influence.

DEFINING A KNOWLEDGE BASE FOR SCHOOL LEARNING

The educational challenges of the 1980s pointed out the need for a knowledge base for learning to guide reform. A knowledge base of school learning should include the learners' contexts, as well as the characteristics of learners themselves. It should not represent a particular philosophy, such as behaviorism or pragmatism. Rather, it should include theories explaining the influences on school learning, empirical results distilled from research studies, and expert judgments about influences on school learning.

Psychological, sociocultural, and instructional theories of learning and schooling should be included in such a knowledge base. Empirical results in a knowledge base for school learning should contain several types of information, including the identification of specific variables affecting school learning and their relative influence. A wide range of variables would have to be considered, including student abilities, preferences, and prior achievement; teacher characteristics and classroom behaviors; instructional materials and practices; amount of time devoted to learning; curriculum content; classroom climate; characteristics of the school, home, and community; district and state educational policies; and demographic information characterizing students, schools, communities, and states. Experts would then be able to confirm or refute empirical findings based on their experience as practitioners and researchers.

Theories, empirical results, and expert judgments are needed to establish a valid knowledge base. In this paper, then, the term knowledge base is used to represent the distillation of understandings from experts, narrative reviews and meta-analyses of variables that influence school learning. (The use of the term knowledge base, however, is not meant to imply the definition used in artificial intelligence research in cognitive science.)

DEVELOPING A THEORETICAL FRAMEWORK

The first step in developing a theoretical framework was to identify a set of variables related to learning. The authors began this process by carefully examining several models of school learning, including those of Bennett (1978), Bloom (1976), Bruner (1966), Carroll (1963), Glaser (1976), and Harnischfeger and Wiley (1976), as analyzed within a systematic theoretical framework (Haertel, Walberg, & Weinstein, 1983). These models contributed broad categories and specific variables to the theoretical framework of school learning. For example, these models operationalized the category student ability, using variables such as aptitude, prior knowledge, verbal IQ, and pupil background. The category motivation was typically included in these models and was operationalized as perseverance, self-concept of the learner, or attitudes toward school and subject matter. The category of classroom instruction was also considered important in all models and encompassed variables such as instructional events; clarity of instruction; and use of cues, feedback, and correctives (Wang, Haertel, & Walberg, 1990).

The emerging theoretical framework was further extended by applying Walberg's (1980) nine factor model of educational productivity. Walberg's model goes beyond the earlier models of school learning by emphasizing out of school influences and social-psychological variables. Walberg's nine factors are: student age or developmental level, ability (including prior achievement), motivation, quantity of instruction, quality of instruction, psychological environment of the classroom, influence of the home, influence of the peer group outside of school, and exposure to mass media.

Also contributing to the emerging framework were the models of adaptive instruction (Wang, 1992; Wang & Walberg, 1985) that describe learning environments intended to maximize individual students' opportunities for success in school. These models consider instructional delivery systems, program design, and implementation. They draw upon Glaser's (1982) notion of "large practical variables," which include "efficient allocation and use of teacher and student time, a classroom management system, systematic teacher feedback and reinforcement of student progress, instructional interactions based on diagnosed learning needs of individual students, and flexible administrative and organizational patterns responsive to program implementation and staffing needs" (Wang et al., 1990, p. 31).

Using effective schools literature (Edmonds, 1979), the authors also identified variables that were correlated with students' success in urban schools. Although school effectiveness has been defined in various ways (e.g., Austin, 1981; Brookover et al., 1982; Kyle, 1985; Purkey & Smith, 1983; Rutter, 1981), the research is remarkably consistent in identifying variables that are related to urban students' successful academic performance. Based on the findings of Brookover (1979), Brookover and Lezotte (1977), Purkey & Smith (1983), and Rutter et al. (1979), the following characteristics of successful schools (both urban and non-urban) have been identified: curriculum articulation and organization, schoolwide staff development, parental involvement and support, schoolwide recognition of academic success, maximized learning time, district support, clear goals and high expectations, an orderly and

disciplined school environment, and the principal's leadership in attending to the quality of instruction. More recent studies identify new variables that are especially suitable for use in inner-city school interventions including careful recording of student progress, the principal's selective influencing of teaching strategies, and expressing high expectations for pupils' achievement (van De Grift, 1990). In summary, the effective schools literature suggests that changes in student and school-level performance are related to a variety of proximal variables such as instructional strategies and practices, as well as distal variables such as school restructuring, types of school organization, and state and local policies.

All of these models of school learning contributed to the final theoretical framework by providing constructs and specific variables. In addition to the models of schooling reviewed above, selected sources were examined for potential specific variables. These sources included Brophy (1986); Segal, Chipman, and Glaser (1985): Glaser (1984); Keogh, Major-Kingsley, Omori-Gordon, and Reid (1982); Wang and Lindvall (1984); Wang, Reynolds, and Walberg (1987-91); and Wittrock (1986).

From these sources and from the models of school learning, 224 variables were organized into a preliminary version of the theoretical framework. Members of the Scientific Advisory Panel of the Temple University Center for Research in Human Development and Education (including 12 prominent researchers in education) reviewed the theoretical framework and provided detailed commentaries. Using the panel members' suggestions, the authors added four more variables and revised the framework's organization. The final version of the theoretical framework contained 228 variables (a list of the 228 variables is available from Margaret C. Wang, Temple University Center for Research in Human Development and Education, Ninth Floor, Ritter Hall Annex, 13th Street and Cecil B. Moore Avenue, Philadelphia, PA 19122), grouped into 30 categories, which were further organized within six theoretical constructs.

The six theoretical constructs used to organize the framework, include: (1) **State and District Governance and Organization**; (2) **Home and Community Educational Contexts**; (3) **School Demographics, Culture, Climate, Policies, and Practices**; (4) **Design and Delivery of Curriculum and Instruction**; (5) **Classroom Practices**; and (6) **Student Characteristics**. Table 1 presents the six theoretical constructs and a description of the 30 categories that are classified within each of the six constructs. In addition, Table 1 presents the complete name of each category and an illustrative variable exemplifying each category. The following six sections describe why each theoretical construct was included in the framework, the types of research studies summarized within each construct, and the variables which operationalize that construct.

State and District Governance and Organization

The theoretical construct of **State and District Governance and Organization** was included in the framework to refer to the effects of formal institutions of government on student learning and classroom practices. Educational policy in the United States is made in "110,000 schools, 15,000 school districts, and

thousands of state and federal agencies." (Grant, 1992, p. xii). Thus, government policy might be initiated at the school, district, state, or federal level (although federal policies are often transmitted through state and local agencies).

For the purposes of this paper, the effects of policy developed at the school level are included within the theoretical construct **School Demographics, Culture, Climate, Policies, and Practices**. For example, effective schools research (Purkey & Smith, 1983), studies on school culture, and studies of organizational coherence would be considered within the **School Demographics, Culture, Climate, Policies, and Practices** construct.

The effects of District Demographics and State and District Policies are categories within the construct **State and District Governance and Organization**. Studies of Chapter 1 staff development (Griffin, 1986) and implementation of policies such as mainstreaming (Meisgeier, 1976) are also included. (See Table 1.) Federal policy, although not mentioned in the construct's title, is thought to be mediated through state and district policies.

Because the U.S. educational system is not centralized the effects of federal government on schools have been weak, a product of both law and tradition (Cohen & Spillane, 1992). State governments have nominally controlled the U.S. educational system. Nevertheless, it has only been in the last few decades that state governments have actually exerted much power (Cantor, 1980). Local districts have traditionally exerted the most influence on U.S. schooling practices. This may account for the paucity of strong effects detected in studies of state and federal policy designed to promote school learning.

Some examples of variables that operationalize this theoretical construct include policies for teacher licensure and guidelines for selection of curricula and textbooks, at the state level. Variables at the district level included teacher evaluation policies, per pupil expenditure, degree of school district bureaucratization, and presence of contractual limits on class size.

Home and Community Educational Contexts

This construct, which includes four categories describing out of school influences on learning (Community, Peer Group, Home Environment and Parental Support, Student Use of Out of School Time) is part of the theoretical framework, because educators and researchers have long believed such contextual influences have strong effects on student learning. (See Table 1.) Although some researchers have questioned the strength of out of school influences, such as parent involvement, on learning (White, Taylor, & Moss, 1992), many other researchers have documented the benefits of family involvement in improving students' academic performance as well as enhancing improvements in school attendance, reducing numbers of dropouts, decreasing delinquency, and reducing pregnancy rates (Epstein, 1988; Graue, Weinstein, & Walberg, 1983; Moles, 1982; Peterson, 1989).

This construct includes not only family involvement but also community, home environment, and peer influences as well. Variables identified in research examining leisure time television viewing (Williams, Haertel, Haertel, & Walberg, 1982), socialization influences (Scott-Jones, 1974), home instruction and learning (Graue et al., 1983), and ethnocultural effects (Brantlinger & Guskin, 1987) were included in this construct. Only recently has the role of community as an influence on school learning been examined through empirical studies. Thus, the research base on community influences used in this paper is limited.

Some community level variables which operationalize this construct include ethnic diversity and quality of social services for students. Examples of home environment and parental support variables include educational environment (e.g., number of books in the home), parental involvement in assuring regular school attendance, and parental interest in student school work. Peer group variables, for example, include level of peers' academic and occupational aspirations, presence of a well-defined clique structure, and the absence of peer substance abuse and criminal activity. Other out of school variables, to name but a few, include student participation in extracurricular school activities, amount of time spent on homework and leisure reading.

School Demographics, Culture, Climate, Policies, and Practices

Since the early 1980s, both scholarly journals and the popular press have devoted considerable attention to the effects of schools on student achievement. The theoretical construct of **School Demographics, Culture, Climate, Policies, and Practices** includes the following categories: Teacher/Administrator Decision Making, School Culture, Schoolwide Policy and Organization, Parental Involvement Policy and School Demographics (See Table 1). Each of these is described below.

School Culture is defined as an ethos affecting teaching and learning. Although out of school influences such as the socioeconomic status of the community impact school culture, such out of school influences are discussed in this paper under the theoretical construct of **Home and Community Educational Contexts**. Here, School Culture refers to the norms of schools, whether they reflect school efforts, community influences, or student characteristics. School norms can range from the status of athletics to attitudes toward graffiti or from the importance of making the honor roll to student respect toward teachers. Among researchers, the most commonly studied attributes of School Culture are variables such as staff retention, collaborative planning and collegial relationships, use of cooperative goal structures, order and discipline, and the recognition of academic achievement (Purkey & Smith, 1983).

The category Teacher/Administrator Decision Making reflects the degree of autonomy and importance that teachers and administrators have in addressing the needs of the school. Teachers sometimes play a decision making role in establishing schoolwide policies, such as uniform discipline, grouping practices, selection of curricula, allocation of resources, the role of team teaching, and effective use of instructional time. Administrators' decision making has usually been viewed as having a greater

impact on schoolwide climate and policy (Brookover, Beady, Flood, Schweitzer, & Wisenbaker, 1979; Dwyer, Lee, Rowan, & Bossert, 1982; Stallings & Mohlman, 1981). For instance, the role of the principal as an instructional leader has received much attention from the research community. Although some researchers are skeptical about the "great principal theory" (Purkey & Smith, 1983), many researchers acknowledge that leadership is an essential ingredient of schoolwide improvement.

The category of School-Wide Policy and Organization covers a wide variety of procedures to maintain the day to day activity of schools. This category, however, does not cover policies toward mainstreaming, desegregation, or Chapter 1, because these policies are articulated at the district or state level, though implemented by individual schools. The category does include policies concerned with grading and academic progress, discipline, attendance, multi-age grouping, instructional teaming, cross-age and peer tutoring, academic tracking, minimization of external classroom disruptions, and attendance and tardiness. This paper addresses this category of variables because such policies are essential to school operation.

The category of Parent Involvement Policy is distinguished in this paper from actual parent involvement. This category focuses on the articulation of policies that define the role of parents in the improvement and operation of the instructional program as well as school-sponsored programs to improve parenting skills. Although schools' use of parent involvement policies is based on mixed evidence, most educators believe that parents should be informed of school goals and responsibilities (Purkey & Smith, 1983) and that parents' involvement does benefit students' completion of homework, attendance, and behavior (Graue et al., 1984). Another means of involving parents in schools employs workshops such as "parent effectiveness training," which are sometimes used to enhance parents' use of consistent discipline, to develop appropriate attitudes toward education, and to promote healthy child-rearing practices.

The research community has looked to School Demographics to explain student learning. Commonly studied school-level demographics include, for example, the size of the school (Gump, 1980), number of classrooms, number of teachers and aides, level of categorical funding (Spady, 1973), and the mix of racial, ethnic and socioeconomic groups (Rutter, 1983).

<u>Design and Delivery of Curriculum and Instruction</u>

This theoretical construct includes three categories: Curriculum and Instruction, Curriculum Design, and Program Demographics (See Table 1). Because researchers agree that the design and delivery of curriculum and instruction impacts the way students learn, it was included in this paper.

The first category Curriculum and Instruction focuses on curriculum content and instructional delivery, both of which affect student learning. Different kinds of student learning result from different kinds of curriculum (Walker & Schaffarzick, 1974). The use of discovery-based science curricula, for instance, encourages students who understand scientific processes, reasoning, and deduction, whereas inductive curricula may produce students with a larger base of scientific facts and greater fluency with

scientific vocabulary (Curbelo, 1985; El-Nemr, 1980; Shulman & Tamir, 1973). Curricular concerns like thematic units, use of multidisciplinary approaches, and use of culturally diverse materials have also been included in this category.

Similarly, different modes of instruction produce different learning outcomes. White and Tisher (1986), for example, review the value of laboratory work versus tutorials, group study, self-study, and lectures as a means of training in problem solving. Results from a variety of primary studies indicate that students believe laboratory work produces different cognitive and affective benefits than teachers do. Instructional arrangements like mastery learning techniques, cooperative learning strategies, personalized instruction, and computer-assisted instruction are included in this category.

The second category is comprised of Curriculum Design variables, which mediate curriculum through teacher presentation of material as well as texts and other educational media. Variables in this category, such as the use of advance organizers, affect student learning. For instance, early studies showed advance organizers had positive effects, but mixed results appeared in the 1970s. White and Tisher (1986) conclude that advance organizers are generally advantageous, though results are not conclusive. Examples of other curriculum design variables covered in this category include: employing specific objectives and learning hierarchies; linking assessment and diagnostic tests to curriculum; and making curriculum available to different size classroom groups and different kinds of learners.

Program Demographics are included in the construct **Design and Delivery of Curriculum and Instruction** because variables such as very small class size have been found to influence student learning (Glass & Smith, 1979). Other demographic variables included in this category are: the number and size of instructional groups, the proportion of students with special needs served in regular classes, the number of classroom aides required, and the amount of curricular resources such as textbooks.

Classroom Practices

The theoretical construct **Classroom Practices** encompasses eight categories (See Table 1). This construct was included because teacher behaviors and classroom organization and management are linked to student outcomes (Brophy & Good, 1986; Rosenshine & Stevens, 1986). Each of the eight categories is discussed in further detail below.

The category Classroom Implementation Support refers to variables that contribute to the implementation of an instructional program. These variables include creating and maintaining instructional materials, configuring classrooms to promote instruction, making use of classroom aides, using records to monitor student progress, establishing efficient classroom routines, communicating classroom rules and procedures, and developing student responsibility for independent self-study.

Variables within the Classroom Instructional category reflect the research on the organization of instruction. It includes techniques to ensure students understand the goals of instruction and the content

being presented. Many of the variables in this category were identified through the "research-based teacher effectiveness literature" including process-product research (Brophy & Good, 1986). Direct instruction is a clear example of the type of instructional technique included in this category. Other illustrative variables are rehearsal and elaboration of new concepts, sequencing of instructional events, confrontation of student misconceptions, signalling of transitions in lessons, redundancy in presentation of content, teacher enthusiasm about content, maintaining expectations about content mastery, providing frequent feedback, promoting metacognitive learning strategies, and scaffolding of instruction.

Variables within the Quantity of Instruction category have been well-researched and there is strong agreement that students need to be fully engaged in their academic pursuits and that teachers need to make wise use of instructional time (Berliner, 1979; Carroll, 1963; Harnischfeger & Wiley, 1976). Illustrative examples of variables in this category include: length of school year and day; time on task; time spent on educational activities such as classroom instruction, homework, field trips, and viewing educational television; and the nature of content missed in regular classrooms when students were removed for "pull out" programs.

The category Classroom Assessment includes standardized, curriculum-based, as well as teacher-made tests to measure student learning. This category is important because so much money has recently been allocated for local, state, and federal tests in the hope of improving student learning (Catterall, 1990). Variables in this category include frequency of assessment, use of descriptive learner profiles rather than simple total scores, and assessment of higher order thought processes as well as basic skills in reading and mathematics.

Classroom Management was included as a category in this theoretical construct because empirical findings abundantly demonstrate the effectiveness of particular classroom management techniques (Doyle, 1986). Effective classroom management has been shown to increase student engagement, decrease disruptive behaviors, and enhance use of instructional time, all of which results in improved student achievement. Examples of variables in this category include minimal classroom disruptions, group alerting, learner accountability, transitions, and teacher "withitness."

The category Student and Teacher Social Interactions refers to the frequency and quality of social interactions in the classroom. These interactions contribute to students' sense of self-esteem and can foster a sense of membership in their class and school (Anderson, Everetson, & Brophy, 1979; Brophy & Good, 1986). Among the variables included are positive verbal interactions among students and teachers, teacher reactions to students' answers, teacher use of praise, teacher coaching of appropriate social behavior, and student responses to questions from students and teachers.

A related category, Student and Teacher Academic Interactions, examines frequency and quality of academic interactions in the classroom. It encompasses teachers' questioning styles, praise, reinforcement, and use of correctives. Illustrative variables include the frequency and difficulty level of teacher questions

and student answers, the use of high post-question wait time, the frequency of calls for substantive oral and written responses.

The category of Classroom Climate focuses on the socio-psychological dimensions of classroom life. Because classroom climate has a moderate positive influence on student achievement (Haertel, Walberg, & Haertel, 1981) it was included in this construct. Characteristics of a classroom with a positive climate include frequent and cooperative interactions between students and teachers, common interests and values, the pursuit of cooperative goals, a clear academic focus, well-organized and well-planned lessons, explicit learning objectives, appropriate level of task difficulty for students, and an appropriate instructional pace (Haertel et al., 1981). The variables in this category reflect these characteristics.

Student Characteristics

This theoretical construct is composed of five psychological categories (Social and Behavioral, Motivational and Affective, Cognitive, Metacognitive, and Psychomotor). Also included is a Student Demographics category and a History of Educational Placement category (see Table 1). Educators have long acknowledged that school learning is strongly influenced by an individual's psychological attributes or aptitudes (Corno & Snow, 1986), demographic variables, such as gender (Becker, 1992), and students' history of educational placement (i.e., promotion, retention, or placement in special education). For this reason, all the above concerns were included in this theoretical construct. Specific categories are described further below.

The first psychological category, Social and Behavioral variables, is important given the social nature of schooling. Many educators believe that children who engage in frequent disruptive behaviors, such as talking out of turn or hitting other children, often perform poorly in school, whereas cooperative children, who engage in positive and constructive behaviors, are more likely to perform well in school. Examples of social and behavioral variables are students' positive, nondisruptive classroom behaviors, appropriate classroom activity levels, cooperativeness with teachers and peers, and ability to make friends.

The variables in the Motivational and Affective category have received increased attention in the past decade, because students' interests, preferences, attitudes toward school and subject matter are recognized as important attributes that foreshadow their tendency to persevere and excel on school tasks. In the 1970s, cognitive psychologists supplied new understandings of self-control and self-regulation as motivational orientations that support learning. Weiner (1976) and Lefcourt (1976) redefined "achievement motivation" and locus of control in terms of cognitive attributions, and Bandura (1977, 1982) developed a cognitive theory of self-efficacy. While their contributions were not directly related to students' performance in school, more recent studies suggest that motivational and affective variables, long acknowledged as important by classroom teachers, must be considered as key attributes necessary for developing independent, self-regulated learners. Examples of variables illustrating this category are

attitude toward school, teacher, and subject matter; motivation for life-long learning; independence as a learner; perseverance on learning tasks; and academic self-competence in subject area.

The importance of variables in the Cognitive category is self-evident. Historically, tests of cognitive aptitudes are highly correlated with school achievement at all age ranges (Corno & Snow, 1986). Cognitive aptitudes include general intelligence, "fluid" and "crystallized" intelligence, prior knowledge, prior competence in reading and mathematics, and verbal knowledge. Other examples of variables included in this category are Piagetian stage of cognitive development; memory; levels of reasoning ability; and specific academic knowledge in subject areas.

During the past decade, researchers have identified a variety of metacognitive processes and learning strategies that guide learners as they perform complex tasks (Brown, 1978). These processes and learning strategies are included within the Metacognitive category. Brown defines metacognitive skills as the planning, activating, monitoring, and evaluating of lower order cognitive skills. Metacognitive processes require mental awareness and self-appraisal of cognitive activities. Employing metacognitive processes and learning strategies enhances students' academic performance (Weinstein & Mayer, 1986). The specific variables comprising the metacognitive category include self-regulatory and self-control strategies, comprehension monitoring, and positive strategies to cope with failure and to generalize concepts (Brown, 1980; Brown & Palincsar).

The last psychological category, Psychomotor, has only one variable. Psychomotor skills specific to the area being instructed were included in this theoretical construct, because they are relevant in any school learning task where physical dexterity may be important such as writing.

The Student Demographics category within the **Student Characteristics** construct includes a range of variables such as chronological age, socioeconomic status, and gender which are correlated with school learning (Walberg, 1980). Variables such as ethnicity, first language, health status, and special education placement are also related to school learning, and thus were included in this theoretical construct.

The final category in the **Student Characteristics** construct is History of Educational Placement. Promotion, retention, or placement in special education are also related to school learning, justifying their inclusion in the theoretical construct.

METHODS

The collection, coding, transformation, summarization, and analysis of the data are described below for each of the three methods of analysis--content analyses, expert ratings, and meta-analyses. Readers uninterested in the technical methodology may wish to skip to the Results section. Appendices 1 and 2 provide specific technical details of the procedures used in collecting, coding, and aggregating the data used in the content analyses and the meta-analyses. Results from the Wang et al. (1990) content analyses of research literature, and Reynolds, Wang, and Walberg's (1992) survey of expert ratings are combined in

this paper with findings from 91 meta-analyses (quantitative syntheses). The uniqueness of this paper is in its comparison and contrast of results across the three methods of analysis and in the calculation of overall statistical estimates of effects.

Content Analyses of Research Literature on School Learning

Wang et al. (1990) reported content analyses of research literature on school learning. Data from the content analyses were employed in the current study. A synopsis of the corpus of studies, coding procedures, and the methods used to summarize the data are described below. A more detailed description is included in Appendix 1.

Selection of a Corpus of Studies. From the large number of review articles on school learning, the authors chose 179 for the final corpus (a complete list of the bibliographic references for the 179 sources is found on pp. 38-42 of Wang et al., 1990). These comprised authoritative reviews and handbook articles, especially documents sponsored by the American Educational Research Association, government documents, and other resources. The final corpus also included studies recommended by the Scientific Advisory Board. (See Appendix 1.) The research literature included mostly sources describing K-12 regular classroom learning but some articles were also included that concern the teaching and learning of mildly handicapped students.

Coding Procedure. A three-point scale was used to code the strength of each of the 228 variables' relation to school learning. Details of the coding procedure are described in Appendix 1.

Data Summary. Means, standard deviations, alpha reliabilities, and frequency of mention were recorded for the 30 categories (Wang et al., 1990, p. 34). Appendix 1 provides more information about how the data was aggregated to represent each of the 30 categories. The alpha reliabilities reported for the 30 categories ranged from .71 to .99; only four of the reliabilities were less than .80, and most exceeded .90. The means for the 30 categories reported in Wang et al. (1990) were used as data in this study.

Expert Ratings of the Importance of Factors Related to School Learning

Reynolds et al. (1992) reported results from a survey of educational researchers on the importance of specific variables to effective school learning. A description of the survey, its administration, and the method used for analyzing the data is summarized below.

The Sample. The population was composed of 134 educational research experts who were first authors of the 179 major annual review and handbook chapters, book chapters, government documents, and journal review articles used in Wang et al. (1990). (Some authors wrote more than one chapter.) Each expert received a survey asking for ratings of the 228 variables along with a follow-up mailing. A total of 61 educational research experts responded for a return rate of 46%.

The Survey. In addition to background information on the expert's area of specialization and institutional affiliation, the machine-scoreable survey asked for a rating on a four-point Likert scale of the

influence of each of the 228 variables on student learning. The scale ranged from "3," indicating strong influence on learning, "2," indicating moderate influence on learning, "1," indicating little or no influence on learning to "0," indicating uncertain influence on learning. The instructions defined learning to include both the process of learning and its outcomes.

Data Summary. A mean rating across the 61 respondents was calculated for each of the 228 variables. The means were aggregated into the 30 categories.

Meta-Analyses of Research Literature on School Learning

Corpus of Studies Synthesized. Effect sizes and correlations were acquired from a six chapter special issue of the International Journal of Educational Research (IJER) (Fraser, Walberg, Welch, & Hattie, 1987) which compiles the results of many meta-analyses of learning. See Appendix 2 for more information on the corpus of studies, included in Fraser et al. (1987). In addition, a library search was conducted to provide subsequent meta-analyses. Appendix 3 contains a list of the meta-analyses from Fraser et al. (1987) and the six additional research syntheses and meta-analyses that were included in the final corpus of studies.

Preparation of Data for Analysis. A set of decision rules was established to guide the selection of statistical results from the 12 tables of results presented in Fraser et al. (1987). These decision rules are presented in Appendix 2. The objective of these rules was to identify the quantitative results that best fit the 30 categories used in the theoretical framework in order to create a data set comprising a correlation or effect size for each of the 30 categories. Statistical results from the six additional meta-analyses acquired in the library search were also incorporated. Mean correlations or effect sizes were available for 23 of the 30 categories.

Some of the meta-analyses reported results in terms of effect sizes rather than correlations. These effect sizes were transformed into correlations (See Appendix 2.) There was one mean correlation for each meta-analysis used. Thus, for each of the 23 categories, there was a set of mean correlations. For example, the category Quantity of Instruction included results from three meta-analyses, and as such, comprised a set of three mean correlations.

Next, a single weighted mean correlation for each of the 23 categories was calculated using the formula and procedure described in Appendix 2. This procedure was followed for each of the 23 categories.

Data Summary. A weighted mean correlation was recorded for 23 of the 30 categories. This set of 23 mean correlations was used in this study.

Analysis of the Content, Expert, and Meta-Analyses Data

Analysis of the three sets of means (content analyses, expert ratings, and meta-analyses) included transforming the data, identifying outliers, and calculating summary statistics and correlations. Two of the

30 categories from the theoretical framework, Accessibility and History of Educational Placements, reflected variables commonly associated with special education practices and were eliminated for purposes of this analysis.

Calculating Scaled Scores for Each Category and the Six Theoretical Constructs

In order for all three data sets to be in a comparable metric, the 28 mean ratings from the content analyses, the 28 mean ratings from the experts, and the 23 weighted mean correlations from the meta-analyses were transformed into z-scores. Z-scores are standardized scores with a mean of zero and a standard deviation of one. The z-scores were then transformed into T-scores which are scaled scores with a mean of 50 and a standard deviation of 10. This eliminated negative numbers and facilitated interpretation of the data. Using the T-scores, an overall mean was calculated for each of the six theoretical constructs and for each of the 28 categories.

Several steps were completed to ensure the accuracy of data entry and transformation. The data were entered and verified. Hand checks were made on several of the transformations from effect size to correlation to ensure their accuracy, as well as on the transformations from raw data to z-scores and from z-scores to T-scores. All transformed scores were reviewed to confirm that the values were within the expected range.

Identifying Outliers

Also using the T-scores, least-squares linear regressions were computed between content ratings and expert ratings; between content ratings and meta-analyses; and between expert ratings and meta-analyses. Each of these three linear regressions was computed utilizing average T-scores for each of the 28 categories in the content analysis and expert ratings, and for each of the 23 categories in the meta-analyses. Examination of scatterplots of residuals around regression lines was used to identify outliers, that is, discrepancies among the three sources of data. The residuals were also examined using the stem and leaf plots in Figure 1.

Stem and leaf plots are a quick way to view a distribution of statistical data (Tukey, 1977). In stem and leaf plots, actual numerical values are presented. For each of the three sets of regression residuals in Figure 1, (content-expert, content-meta-analyses, expert-meta-analyses) a column, or stem, is presented. The left side of the stem contains the first digit of a residual. On the right side of the vertical stem is a row of digits, with each digit representing one leaf. Each leaf is the second digit of a residual. To read the stem and leaf plot, take the value to the left of the stem and combine it with each leaf to the right of the stem. For example, using the content-expert stem, there are four residuals presented with the values -.10, -.10, -.11, and -.15. There is also one residual with the value .15 and so on. Using these plots, residuals can be examined and outliers identified. For the content-expert residuals there is one clear outlier, .34. The same procedure was used to identify outliers for each of the three sets of residuals. Based on these

procedures, four categories were identified as outliers, State Policy, Student Use of Out of School Time, Psychomotor, and Program Demographics, and omitted from further correlational analyses.

RESULTS

The results of this study are presented in four sections. The first section characterizes the final corpus of 270 reviews (179 handbook chapters and reviews, and 91 meta-analyses). The second section presents an average T-score for each of the six theoretical constructs. Summary statistics, including average T-scores for the 28 categories are presented in the third section. In addition, the third section lists the highest and lowest T-scores within each of the three methods (content analyses, expert ratings, and meta-analyses). The final and fourth section presents correlations between content analyses, expert ratings, and meta-analyses.

Characteristics of the Final Corpus of 270 Reviews

Table 2 presents the substantive focus and disciplinary orientation of the 270 reviews and syntheses that were summarized in the content analyses (179 handbook chapters and reviews) and in the 91 meta-analyses (research syntheses). The foci of the reviews match the six theoretical constructs used in developing the framework. The six foci range from indirect determinants of learning such as **State and District Governance and Organization** to the more direct determinants of student learning, including **Design and Delivery of Curriculum and Instruction, Classroom Practices,** and **Student Characteristics.** The academic disciplines represented in Table 2 include political science and policy studies, sociology and anthropology, psychology, and multidisciplinary studies, (i.e., several social science disciplines, including some educational and curriculum studies). Psychological studies were further divided into three groups: (1) those studies that examined behavioral constructs such as reinforcement, cues, and token economies; (2) studies examining cognitive constructs such as expectancies, attributions, metacognitive strategies, and teacher questioning styles; and (3) general psychological studies that encompassed both behavioral and cognitive constructs, or had no clear psychological orientation.

The studies classified in Table 2 demonstrate that 70% of the education reviews and meta-analyses reported in this paper have a psychological orientation, 13% a multidisciplinary approach, 11% a political science or policy orientation, and 6% have a sociological or anthropological orientation. Classifying studies by focus and discipline shows that studies of state and district governance reflect a political science and policy perspective. Studies of home, community, and schoolwide contexts have a sociological and anthropological perspective. On the other hand, studies of more direct determinants of student learning, such as **Design and Delivery of Curriculum and Instruction, Classroom Practices,** and **Student Characteristics,** typically have a psychological perspective.

The corpus of 270 reviews includes many studies of direct determinants of learning. Direct determinants of learning are operationalized using proximal variables, those variables which have an

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immediate effect on students. Student aptitudes and classroom practices are examples of proximal variables. Indirect determinants of learning are operationalized using distal variables which are one or more steps removed from students' day-to-day lives. State and district policies and demographics are examples of distal variables. Because fewer studies in this corpus examined distal variables, it is more difficult to generalize about their influence compared to the influence of proximal variables.

All of the 270 reviews included in this corpus have student learning as a dependent variable. The majority of them operationalized student learning in terms of academic achievement. Examples of measures of these outcomes included: achievement tests, curriculum-based tests, and tests mandated by school districts, states, and the federal government. In some studies, variables can be related to learning on a single occasion whereas a different set of variables may be related to changes in learning over time. In this synthesis, it was estimated that 75% of the studies examined learning on a single occasion whereas 25% examined learning over time.

Average T-Scores for the Six Theoretical Constructs

To understand better which of the six theoretical constructs most influenced student learning, the mean T-scores of all categories within each construct were averaged together, yielding a grand mean for each construct. Table 3 presents the grand means for each of the six theoretical constructs, ordering them from greatest to least effect.

In this research, the theoretical construct with the greatest effect was **Student Characteristics**, followed by **Classroom Practices**, and **Home and Community Educational Contexts**. Having less effect were **Design and Delivery of Curriculum and Instruction** and **School Demographics, Culture, Climate, Policies, and Practices**, while **State and District Governance and Organization** had the least effect.

Student Characteristics, **Classroom Practices**, and **Home and Community Educational Contexts** are direct determinants of student learning, while **Design and Delivery of Curriculum and Instruction**, **School Demographics, Culture, Climate, Policies, and Practices**, and **State and District Governance and Organization** are indirect determinants of student learning. Constructs that are close to students' defining characteristics and educative experiences, for example, psychological aptitudes, classroom practices, and home and community environments, exert the most influence on student learning. On the other hand, constructs that are removed from students' and their everyday learning experiences, like state and district policy, exert the least influence on student learning.

Average T-Scores for the 28 Categories

Table 4 presents the average T-scores for the three methods: content analyses, expert ratings, and meta-analyses, and an overall average T-score for each of the 28 categories.

Average T-Scores by Category. The overall average T-scores for each of the 28 categories ranged from 64.8 to 32.9 (range = 31.9). The categories with the highest average T-scores carried the most

influence on student learning. The five most influential categories were: Classroom Management, Metacognitive, Cognitive, Home Environment, and Student and Teacher Social Interactions. The average T-scores for these five categories ranged from 64.8 to 56.7 (range = 8.1). Categories with the lowest average T-scores included: Program Demographics, School Demographics, State and District Policies, School Policy and Organization, and District Demographics. Average T-scores for these categories ranged from 42.8 to 32.9 (range = 9.9). These results demonstrated that proximal variables exert more influence than distal variables on school learning. The remaining 18 categories listed in Table 4 cannot be as easily characterized. However, many of the more influential categories were associated with psychological and classroom practice variables, both of which are proximal, while the less influential categories like out of school time and policies about parent involvement tend to be distal variables.

Average T-Scores for Each of the Three Methods

This section describes the range of T-scores for the content ratings, expert ratings, and meta-analyses (See Table 4).

Content Ratings. Average T-scores for the content ratings of the 28 categories are presented in Table 4. They ranged from 71.2 for the Psychomotor category to 22.4 for the State and District Policies category (range = 49.3). The categories with the five highest ratings included Psychomotor, Metacognitive, Classroom Management, Quantity of Instruction, and Student and Teacher Social Interactions, extending from 71.2 to 57.3 (range = 13.9). The Psychomotor category, which received an exceptionally high content rating, was considered an outlier when the correlational analyses were performed. Its high content rating was the result of two review articles that reported very strong effects based on Skinnerian and behavioral analyses of psychomotor skills. The five categories with the least influence were Parent Involvement Policy, Teacher and Administrator Decision Making, District Demographics, School Policy and Organization, and State and District Policies extending from 41.6 to 22.4 (range = 19.2). Again, proximal categories, which include psychological and classroom variables, have more impact on learning than do distal categories which include policy and demographic variables.

Expert Ratings. Average T-Scores for the expert ratings of the 28 categories are also presented in Table 4. The scores ranged from 68.0 for the Metacognitive category to 32.8 for the State and District Policies category (range = 35.2). The categories with the five highest ratings were Metacognitive, Classroom Management, Motivation and Affective, Home Environment and Parental Support, and Classroom Instructional, extending from 68.0 to 59.3 (range = 8.7). Categories receiving the lowest expert ratings were School Policy and Organization, Psychomotor, School Demographics, District Demographics, and State and District Policies, extending from 39.1 to 32.8 (range = 6.3). The 61 educational researchers, who wrote definitive review articles and rated the importance of the 228 variables, clearly believed that proximal variables like psychological attributes, classroom instructional variables, and

the home environment, have the most influence on student learning, whereas distal variables like demographics and policy were rated as less important.

Meta-Analyses. Average T-Scores for the meta-analyses, presented in Table 4, ranged from 70.2 for the Cognitive category to 32.6 for the Out of School Time category (range = 37.6). Unlike the other methods of analysis which included all 28 categories of variables, this method had only 23 categories of data available, because meta-analyses could not be found for five categories. The five categories with the highest average T-scores were Cognitive, Classroom Management, Home Environment and Parental Support, Metacognitive, and Student and Teacher Academic Interactions, extending from 70.2 to 59.3 (range = 10.9). The five with the lowest ratings were School Policy and Organization, Classroom Implementation and Support, Psychomotor, Program Demographics and Out of School Time, extending from 40.8 to 32.6 (range = 8.2). Generally, the proximal variables included in the psychological, classroom instructional, and home environment categories had the most impact on school learning, while distal variables like policy and demographics once again had less influence.

Degree of Consensus Among the Three Methods of Analysis

Pearson product-moment correlations were computed among content analyses ratings, expert ratings, and meta-analyses. Prior to computing each of these correlations, separate sets of outliers were identified as described in a previous section (Identifying Outliers).

Content Analyses-Expert Rating Correlation. The correlation between content analyses and expert ratings is .704 ($p < .01$). Before computing this correlation, the following four categories were identified as outliers and not included in the analysis: State and District Policies, Out of School Time, Psychomotor, and Program Demographics. The correlation of .704 suggested that there is substantial agreement about what variables impact learning most, based on the agreement between experts' ratings and the content analyses of handbook chapters and narrative reviews. When asked to rate the 228 variables, the 61 experts, regardless of their area of expertise, did not simply rate their own specializations as important, but instead rated the importance of variables based on a "transdisciplinary" understanding of what influences learning.

Content Analyses-Meta-Analyses Correlation. The correlation between content analyses and meta-analyses was .514 ($p < .05$), showing a moderate degree of agreement. The categories identified as outliers and eliminated before the correlation was computed were State and District Policies, Out of School Time, Psychomotor, and Program Demographics. This correlation provided evidence of "inter-source" reliability. The agreement between the meta-analyses and content analyses demonstrates the robustness and consistency of the results regardless of the source, whether it is a narrative review as represented in the content analyses or a meta-analysis.

Expert Ratings-Meta-Analyses Correlation. The correlation between expert ratings and meta-analyses was .587 ($p < .01$), evidence of moderate agreement. Only one category, State and District Policies, was identified as an outlier and removed before the correlation was computed. This correlation demonstrates

agreement between expert ratings and the meta-analyses regarding the strength of different categories' effect on student learning. Thus experts' understanding of what impacts learning agrees with empirical findings established through 91 meta-analyses. This finding along with the other two correlations suggests general agreement among experts and empirically-based findings about what variables impact school learning and their relative strength.

DISCUSSION

Evidence suggests that an emergent knowledge base, though neither formalized nor explicit, underlies learning. This evidence comes from the disciplines of psychology, sociology, anthropology, political science, and multidisciplinary (including curriculum) studies. Because these different academic disciplines have directed their attention to different influences on schooling, they have helped to establish a knowledge base that looks at learning through many lenses, and that spans an array of influences on learning from the proximal to the distal. The presence of this knowledge base is demonstrated by the consensus of experts and findings from empirical research. Regardless of which method of analysis (content analyses, expert ratings, or meta-analyses) was employed, there was moderate to substantial agreement on the relative sizes of influences on school learning.

Perspectives of Different Academic Disciplines

The perspectives of different academic disciplines have directed researchers' attention to different types of variables in the study of learning. Although disciplinary views of education cannot be comprehensively summarized here, it may be useful to remind readers of a few characteristic contributions of these disciplines. Political scientists have focused on federal, state, and district level policy variables. Historically, sociologists have been concerned with demographic variables such as social class and minority group membership. Sociologists have contributed to the research on effective schools and have frequently advocated schoolwide organizational solutions to educational ills. Psychologists have directed their attention to the psychological and individual characteristics of teachers and learners and have attended not only to psychological characteristics of the learner, but features of the classroom, home, and community that foster learning and promote responsibility and independence in students. Diverse disciplines have provided educators with information on many types of variables, both proximal and distal, that comprise the knowledge base underlying academic learning.

Correlations Support a Knowledge Base

The handbook chapters and narrative reviews summarized in the content analyses often describe research results without quantifying them, nor do they cover comprehensively all primary studies or employ explicit search criteria in many cases. Meta-analyses, on the other hand, statistically summarize results of many primary studies and use explicit criteria for the inclusion and exclusion of studies. Thus, results from the handbook chapters and narrative reviews are not isomorphic with the meta-analyses.

Nevertheless, the magnitude of the correlation between the meta-analyses and the narrative reviews suggests an emergent knowledge base. The moderate correlation of expert ratings with results from both the meta-analyses and the narrative reviews further suggests an emergent knowledge base on influences on learning.

The Relative Importance of Distal and Proximal Variables

Distal variables, like state, district, and school level policy and demographics, have little influence on school learning. This finding is inconsistent with current conventional wisdom which argues for policy-driven solutions, like school restructuring, school-site management, and tougher teacher credential requirements and evaluation, to improve student learning. Characteristics of effective schools have been documented to some extent (Holmes, 1989). Consistent with the findings of this paper, however, recent research is providing evidence of the limited impact of some schoolwide policies, such as special education classification and placement, (Gamoran & Berends, 1987; Wang, Reynolds, & Walberg, 1988) tracking, (Oakes, 1985) and retention (Holmes, 1990; Shepard & Smith, 1989) on student outcomes. The moderate degree of consensus across the three methods of analysis illustrates the common understanding that distal variables have lesser impact. This understanding also contributes to the knowledge base on learning.

Distal variable are at least one step removed from the daily learning experiences of most students. Simply instituting new policies, whether state, district, or school level, will not necessarily enhance student learning. Implementing a policy of maximized learning time, for example, does not guarantee that students in a given classroom will receive instruction from a teacher who plans lessons with special attention to eliminating poor management practices and inefficient use of time. Policies do not always reach down to the classroom level. Effective policies require implementation by teachers at the classroom and student level.

In a recent interview, Cohen (Brandt, 1991) described the work of the National Alliance for Restructuring Education. The organization's efforts to assist in school restructuring for a network of five states and seven districts provides further evidence of the limitations of distal variables and the importance of proximal variables in improving student outcomes. Cohen characterizes proximal variables as equally if not more important than distal variables in tackling school problems. He further maintains that schools should begin solving problems by addressing proximal variables like curriculum, instruction, and assessment that emphasize student outcomes.

Based on the results of content analyses, expert ratings, and meta-analyses summarized in this paper, proximal variables strongly influence school learning. Proximal variables like psychological, instructional, and home environment variables have more impact on learning than most of the variables studied and should be part of an effective strategy to promote student learning.

Key Proximal Variables Influence Student Learning

Key types of proximal variables -- psychological, instructional, home environment -- which exert especially strong effects, are described below.

Psychological. The psychological aptitudes which play the most significant role in school learning are metacognitive, cognitive, motivational and affective variables; each is discussed further. One of the most significant educational findings of the last decade has been the documentation of metacognitive processes that serve to guide students through learning tasks. Many research articles have described metacognitive processes and applications such as comprehension monitoring, strategies to facilitate generalization of concepts, self-regulatory and self-control strategies, cognitive skills instruction, and reciprocal teaching (Segal et al., 1985; Wang & Palincsar, 1989; Weinstein & Mayer, 1986). Research results on metacognition have been especially helpful in developing instructional strategies for children from educationally disadvantaged and at-risk backgrounds (Means & Knapp, 1991). Cognitive processes have also been identified as highly influential. Historically, cognition, whether defined as general intelligence, prior knowledge, or specific subject matter competence, has always been considered of prime importance. That estimation is confirmed by this empirical research and the evaluations of experts. Motivational and affective attributes are now considered cognitive constructs and play a key role in students' perseverance and enthusiasm for learning. All of these psychological attributes are essential to the development of independent, self-regulated learners. Currently, many educational and psychological theorists conceive of learners as architects building their own knowledge structures, a conception that reflects the cognitive paradigm of learning now prominent in the social sciences (Gardner, 1987).

Instructional. Instructional variables exert significant influence on school learning. In the past decade, research on classroom management has demonstrated the effectiveness of a variety of instructional techniques and teacher behaviors in controlling classrooms and enhancing achievement (Doyle, 1986). Examples of classroom management techniques include the prompt and efficient handling of routine tasks, the minimization of distractions and interruptions, having materials ready for use, and handling behavior problems in a manner that is minimally disruptive to the classroom.

One type of classroom interaction that has been linked to student outcomes is the amount and quality of teacher and student academic interactions. Academic interactions promote learning by making students aware of subject-specific knowledge structures and then helping them develop internal representations of those knowledge structures. An example of a teacher and student academic interaction is questioning students. Teacher questioning can be characterized by the frequency of questions, cognitive level of questions, range of difficulty-level, the kinds of responses encouraged (extended vs. one word), and post-question wait time.

A second type of classroom interaction that has also been linked to student outcomes is the frequency and quality of teacher and student social interactions. When teachers engage students in social

interactions, they can model appropriate behaviors, dissuade students from disruptive behavior, and establish a classroom atmosphere conducive to learning. Positive teacher and student social interactions contribute to students' sense of self-esteem and foster a sense of membership in the classroom and school. Social interactions can also include praise and corrective feedback that guide student learning. Not all praise and feedback is initiated by teachers, however; students can also provide feedback and praise to their classmates in cooperative learning situations and through peer and cross-age tutoring.

Home Environment. The proximal variables encompassed by the home environment include not only the educational characteristics of the home, but also parent activities and attitudes that support student learning. Representative activities and attitudes include parents' expression of interest in student school work, participation in school conferences, expectations for students' academic success, and ensuring completion of homework and school attendance. In contrast to distal variables which are more removed from students' day to day lives, the home is central to students' daily experience. Consequently, the home functions as the most salient out of school context for student learning, amplifying or diminishing the school's effect on learning.

Implications for Practice

If practitioners and teacher educators wish to enhance school learning, they must attend to proximal variables such as: (1) psychological variables, especially metacognition and cognition; (2) classroom instruction and management, and student and teacher social and academic interactions; and (3) the home environment. Findings from cognitive psychology, including the importance of prior knowledge, individual aptitudes, and metacognitive processes, should inform teaching. Students' prior knowledge and level of understanding must be taken into account as teachers attempt to structure new content. Individual differences in psychological aptitudes such as verbal fluency, spatial reasoning, and numeracy influence students' ability to perform in school. In order to develop effective lessons, teachers need to determine students' levels of prior knowledge, their relevant psychological aptitudes, and their use of learning or metacognitive strategies. Instructional strategies like reciprocal teaching, cognitive skills instruction, and adaptive instructional systems incorporate the kinds of proximal psychological variables which promote school learning.

Findings on the salience of classroom instructional variables should also inform teachers' practice. Efficient classroom management enables teachers to spend more time on instruction than addressing discipline problems and bureaucratic tasks. The increased quantity of time for instruction is positively related to enhanced student achievement. Teacher and student academic interactions promote learning by allowing teachers to receive more regular feedback about the effectiveness of their instruction and to tailor that instruction to meet the specific needs of their students. Students benefit from academic interactions with teachers by receiving instruction that matches their prior knowledge, addresses their misconceptions, and organizes knowledge in ways that are meaningful. Instructional techniques such as scaffolding

mediate between student's prior knowledge and new content. Just as teacher and student academic interactions foster learning, so do social ones. Teachers should engage in positive social interactions with students to minimize disruptions, to develop an orderly classroom and safe school environment, to encourage creativity and tolerance towards divergent points of views, and to promote the value of learning.

Because of the importance of the home environment to school learning, teachers must also develop strategies to increase parent involvement in their children's academic life. This means teacher should go beyond traditional once-a-year parent/teacher conferences and work with parents to see that learning is valued in the home. Teachers should encourage parents to be involved with their children's academic pursuits on a day to day basis, whether helping with homework, monitoring television viewing, reading to their young children, and simply expressing the expectation that their children will achieve academic success.

The evidence linking distal to proximal variables and to learning is sparse. Distal variables such as district and state policies may set the stage for classroom practices that affect student learning, but findings from the present review provide little supporting evidence. Distal policies are likely to make a major difference in learning only when they affect proximal practices. Indeed, these findings may be reflective of a lack of implementation and/or the complexities that are generally associated with the implementation of distal processes.

Two major findings from the present review suggest important policy implications: the actions of students, teachers, and parents matter most to student learning; policies at the program, school, district, state, and federal levels have limited effect compared to the day-to-day efforts of the people who are most involved in students' lives. Knowing that proximal variables have a greater impact on school learning than distal ones, educators, when formulating policies, should be mindful of where they can make the biggest difference in terms of the student, the classroom, and the home.

CONCLUSIONS

Three huge bodies of evidence suggest that a knowledge base for school learning has been emerging in the last several decades. Hard-won evidence is attributable to efforts of thousands of primary researchers whose contributions can now be synthesized in several ways. Conventional reviews, meta-analyses, and expert ratings show moderate to substantial agreement on the relative sizes of influences of variables on academic learning. This review, however, uncovers some discrepancies among the three sources of information that should be incentives for additional research. It can be hoped that future primary studies and syntheses will produce greater consistency.

Still, there are limitations on the ultimate precision that can be sought. Even in the primary studies, estimates are affected by the validity of measures of the independent and dependent variables, the match

between what is taught and tested, the sampling of students, and other factors. In some instances, however, the greater the shortcomings in validity, the greater the underestimation of effects.

Reviewers choose or are chosen to write about teaching methods and other educational variables that have interested them; selective conceptual biases may be operating. Reviewers may underestimate or overestimate effects; certainly they are affected by their own theoretical and/or disciplinary proclivities, spirit and fads of the times, and methodological limitations and advances. Psychology, for example, has not always preserved a balance among behavior, cognition, and conation.

In projecting future results from the present findings, great caution is necessary. Poorly implemented versions of previously successful practices, especially those shown in special circumstances, are unlikely to work as well. Some practices that work well in some settings and with some students may not work as well with others, although evidence for such exceptionality is easier to hypothesize than to show consistently. The aggregated estimates nonetheless provide one reasonable basis for formulating educational policies and practices. They represent what can be distilled from an enormous body of educational research extending over the last half century; and the independent sources of evidence show reasonable agreement.

Ironically, state, district, and school policies that have received the most attention in the last decade of educational reform appear least influential on learning. Changing such remote policies, even if they are well intentioned and well founded, must focus on proximal variables in order to result in improved practices in classrooms and homes, where learning actually takes place.

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APPENDIX A

Technical Information on the Content Analyses of Research Literature on School Learning

Selection of a Corpus of Studies

The final corpus of studies summarized in the content analyses included authoritative reviews and handbook chapters. The final corpus included journals and books published by the American Educational Research Association, government documents and literature recommended by the Scientific Advisory Board at Temple University. Chapters from the Annual Review of Psychology, the Annual Review of Sociology, Designs for Compensatory Education (Williams, Richmond, & Mason, 1986), the Handbook of Research on Teaching (Wittrock, 1986), the Review of Research in Education, other handbooks, and journal review articles were included to ensure coverage of every category in the conceptual framework. In all, over 200 chapters and review articles were identified and read for possible inclusion, and 179 were selected for coding.

Coding Procedure

The authors developed a 3-point scale to code the strength of each of the 228 variables' relation to school learning. Variables with weak relations to learning were coded 1, those with moderate relations were coded 2, and those with strong relations were coded 3. Variables were coded on the basis of statistical measures (effect sizes/correlations), quantitative measures (the proportions of studies confirming a variable's strength), and qualitative measures (descriptions of results).

For those studies that reported results in terms of effect sizes or correlations, a score of 1 was given if the effect size was less than .10; a score of 2 was given if the effect size was between .10 and .33; and a score of 3 was given if the effect size was greater than .33. For those variables for which quantitative measures were reported, a score of 1 was assigned if less than 40% of the reported studies found a statistically significant relation to a learning outcome; a score of 2 was assigned if between 40% and 80% of the reported studies found a significant relation; and a score of 3 was reserved for those variables in which more than 80% of the reported studies indicated a significant relation. For those items for which no statistical or quantitative indicators were reported, a judgment of weak (1), moderate (2), or strong (3) was made on evidence provided in the document's prose description of the results.

A 15-page coding form was used to record the detailed ratings for each source (handbook chapters, review articles, etc.). Over 2,500 pages of coding forms containing the detailed ratings were completed. Both the page number in the source and the reported strength for each variable were recorded for each citation or discussion. Obviously, none of these sources discussed all 228

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variables. In any given source, however, there might be multiple ratings of strength and several discussions or results reported on any number of the 228 variables. Because the sources coded are handbook chapters and review articles, information on specific features of the primary studies (such as the unit of analysis, grade levels, or subject matter) summarized in these chapters could not be coded--rather, the synthesis focuses on the strength of influences and effects.

The coding process yielded about 10,000 detailed ratings, which were summarized on a summary form for each of the 179 sources. Recorded on the summary forms was an overall mean rating of strength of influence for each of the 228 variables discussed. After calculating an overall mean for each of the 228 variables for a given source, the 10,000 detailed ratings were aggregated into about 3,700 summary ratings which were then statistically analyzed.

Data Summary

The 3,700 summary ratings were further aggregated into 30 categories. As reported earlier, means, standard deviations, alpha reliabilities, and frequency of mention were calculated for these 30 categories. (Wang, Haertel, & Walberg, 1990, p. 34).

APPENDIX B

Technical Information on the Meta-Analyses of Research Literature on School Learning

The findings in Fraser et al. (1987) were compiled from the results of many meta-analyses (or quantitative syntheses). Quantitative results from chapters 2, 3, and 4 were used in the current study. Chapters 1 and 6 were not included because they did not contain quantitative results. Chapter 5 was not included because it summarized the results of chapter 2. The current study used 85 meta-analyses discussed in Fraser et al . Their results were recorded in 23 of the 30 categories of the conceptual framework. Because the meta-analyses summarized in Fraser et al. did not cover all 30 categories, the authors of this article conducted a library search described at the end of this appendix.

Description of the Contents of Fraser et al. (1987) Chapters 2, 3, and 4

Chapter 2, "Syntheses of Research on Factors Influencing Learning," summarized meta-analyses of approximately 2,575 individual studies that identified nine aptitudinal, instructional, and environmental factors that have consistently exhibited strong influences on student learning (See Fraser et al., p. 155, for examples of the studies included). The results spanned 50 years of research conducted within and outside the United States. These results included narrative reviews and quantitative syntheses or meta-analyses summarizing results for each of Walberg's nine productivity factors. In addition, results from three large sets of statistical data on elementary and high school students were included. These data included information from the National Assessment of Educational Progress (NAEP), High School and Beyond, and the International Study of Educational Achievement (IEA). Also included were results from studies of the most effective ways to bring about constructive changes in schools as well as results from case studies of Japanese and American classes, which compared educational productivity in these two countries. Results from the syntheses of the several thousand individual studies were presented as correlations or effect sizes.

Chapter 3, "Contextual and Transactional Influences on Science Outcomes," presented results of meta-analyses of individual bivariate studies conducted within and outside the United States. This chapter focused exclusively on educational productivity in science education. The impact of contextual and transactional factors on science outcomes was synthesized. Contextual factors included, for example, student characteristics, teacher characteristics, curriculum materials, facilities and equipment, home environment, and school climate. Transactional factors included student behaviors, teacher behaviors, external intrusions, instructional research exposure, and classroom climate. The science outcomes studied included student achievement, student attitudes, student skills,

teacher change, scientific literacy, and career choices. The research syntheses and meta-analyses summarized in this chapter were based on ERIC's yearly reviews of science education, Project Synthesis results, and new quantitative syntheses reported in the research literature. (For examples of the meta-analyses summarized, see Fraser et al., 1987, pp. 167-182.) Results from the syntheses were reported as mean correlations, mean effect sizes, or aggregate multiple regression results.

Chapter 4, "Identifying the Salient Facets of a Model of Student Learning: A Synthesis of Meta-Analysis," presented results from 134 meta-analyses of achievement outcomes and 92 meta-analyses of attitude outcomes. The corpus of studies synthesized in this chapter was identified using a computer search of psychological abstracts, dissertation abstracts, and ERIC. Only research syntheses with 10 or more studies related to achievement were included. All results were presented as overall correlations.

Library Search to Identify Additional Syntheses

A library search was conducted to provide coverage for the seven categories not represented in Fraser et al. (1987), as well as to provide results from more recent syntheses. Thirty-six new sources, compiled from journal articles, books, and an ERIC search, were identified as possible supplements. After evaluating the new sources for their type and quality of data, only 12 of the 36 syntheses contained quantitative data. However, because six of the studies reported in Fraser et al. also were reported among the results in the 12 additional research syntheses, only the other six additional research syntheses were added to the corpus. The six additional syntheses did not increase the coverage of the categories of missing data, but they did provide more comprehensive coverage of some of the 228 variables within the 23 categories. The final list of quantitative studies synthesized for the current article is presented in Appendix C.

Description of the Decision Rules Used

Because the results of chapter 4 in Fraser et al. (1987) were not limited to science education (as was chapter 3) and because they contained results from 134 syntheses (including some of those reported in chapter 2), chapter 4 became the starting point for the selection of correlations and effect sizes.

The first decision rule was to scan chapter 4 for those results that most closely matched the definitions of the 30 categories. If a single result matched one of the categories, that result was selected. If several results were reported that matched one of the categories, the statistical average of those results was recorded. In chapter 4, for example, a variety of correlational results was presented that could be defined as cognitive variables; these results included intelligence, general ability, prior

achievement, Piagetian developmental level, cognitive ability, and cognitive style. The average of the correlations associated with these variables was computed and recorded for the cognitive category.

For those categories where no match was found, a second decision rule was applied: Scan chapter 2 for those results that most closely matched the definition of the remaining categories. For those categories where a match was yet to be found, a third decision rule was applied: Scan chapter 3 for those results that most closely matched the definition of the remaining categories. Finally, if after scanning all three chapters and the six additional syntheses identified in the library search, there was no match found for a particular category, the category remained empty and was assigned a missing data value.

Effect Size Transformation to Correlation

The effect sizes (d) were transformed into correlations (r) using the following formula (Cohen, 1969):

$$r = d/(d^2 + 4)^{1/2}$$

Formula and Procedure in Weighting Mean Correlations

Because each of the mean correlations in this study was itself an aggregated statistic, it represented different numbers of relationships. Weighting allowed those mean correlations based on a large number of relationships to exert more influence in the calculation of the single, weighted mean correlation for the category. Mean correlations based on one or a small number of relationships exerted, then, less influence. For a category combining results from three syntheses, for example, the following formula was employed to calculate the weighted mean correlation (Mw). The mean correlation (r) for each synthesis was multiplied times the number of statistical relationships (n) in the synthesis to arrive at a product. These three new products were summed and then divided by the sum of all the statistical relationships in the three syntheses. This produced the weighted mean (Mw) for the category.

$$Mw = \Sigma(r * n)/\Sigma(n)$$

APPENDIX C

Meta-analyses of Educational Research taken from Fraser, Walberg, Welch, and Hattie (1987). Syntheses of Educational Productivity Research. In The International Journal of Educational Research, Vol. 11, No. 2, and Additional Subsequent Studies.

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Figure 1
Stem-and-Leaf Plots of Residuals

Content – Expert		Content – Meta-Analyses		Expert – Meta-Analyses	
-.4		-.4		-.4	
-.3		-.3	3	-.3	
-.2		-.2		-.2	3
-.1	0015	-.1	0014	-.1	27
-.0	1112358899	-.0	3779	-.0	111235699
.0	000011277889	.0	0112346779	.0	04556689
.1	5	.1	0	.1	248
.2		.2	11	.2	
.3	4	.3	1	.3	
.4		.4		.4	

Table 1

Description of Theoretical Constructs, Categories, and Illustrative Variables Incorporated into the Theoretical Framework

State and District Governance and Organization
These categories are associated with state- and district-level school governance and administration. They include state curriculum and textbook policies, testing and graduate requirements, teacher licensure, specific provisions in teacher contracts, and some district-level administrative and fiscal variables.

Category	Illustrative Variable
District Demographics	School District Size
State and District Policies	Teacher licensure requirements

Home and Community Educational Contexts
These categories are associated with the home and community contexts within which schools function. They include community demographics, peer culture, parental support and involvement, and amount of time students spend out of school on activities such as television viewing, leisure reading, and homework.

Category	Illustrative Variable
Community	Socioeconomic level of community
Peer Group	Level of peers' academic aspirations
Home Environment and Parental Support	Parental involvement in ensuring completion of homework
Student Use of Out of School Time	Student participation in clubs and extracurricular activities

School Demographics, Culture, Climate, Policies, and Practices
These categories are associated with school-level demographics, culture, climate, policies, and practices. They include demographics of the student body; whether the school is public or private, and levels of funding for specific categorical programs; school-level decision-making variables; and specific school-level policies and practices, including policies on parental involvement in the school.

Category	Illustrative Variable
School Demographics	Size of school
Teacher/Administrator Decision-Making	Principal actively concerned with instructional program
School Culture (Ethos conducive to teaching and learning)	Schoolwide emphasis on recognition of academic achievement
Schoolwide Policy and Organization	Explicit schoolwide discipline policy
Accessibility	Accessibility of education program (overcoming architectural communication and environmental barriers)
Parental Involvement Policy	Parental involvement in improvement and operation of instructional program

Design and Delivery of Curriculum and Instruction
These categories are associated with instruction as designed and with the physical arrangements for its delivery. They include the instructional strategies specified by the curriculum, and characteristics of instructional materials.

Category	Illustrative Variable
Program Demographics	Size of instructional group (whole class, small group, and one-on-one instruction)
Curriculum and Instruction	Alignment among goals, contents, instruction, assignments, and evaluation
Curriculum Design	Materials employ advance organizers

Table 1 (Continued)

Classroom Practices

These categories are associated with the implementation of the curriculum and the instructional program. They include classroom routines and practices, characteristics of instruction as delivered, classroom management, monitoring of student progress, quality and quantity of instruction provided, student/teacher interactions, and classroom climate.

Category	Illustrative Variable
Classroom Implementation Support	Establishing efficient classroom routines and communicating rules and procedures
Classroom Instruction	Use of clear and organized direct instruction
Quantity of Instruction	Time on task (amount of time students are actively engaged in learning)
Classroom Assessment	Use of assessment as a frequent integral component of instruction
Classroom Management	Group alerting (teacher uses questioning/recitation strategies that maintain active participation by all students)
Student and Teacher Social Interactions	Student responds positively to questions from other students and from teacher
Student and Teacher Academic Interactions	Frequent calls for extended, substantive oral/written response (not one-word answers)
Classroom Climate	Cohesiveness (members of class are friends sharing common interests and values emphasizing cooperative goals

Student Characteristics

These categories are associated with individual students, including demographics, academic history, and a variety of social, behavioral, motivational, cognitive, and affective characteristics.

Category	Illustrative Variable
Student Demographics	Gender and marker
History of Educational Placement	Prior grade retention
Social and Behavioral	Positive, nondisruptive behavior
Motivational and Affective	Attitude toward subject matter instructed
Cognitive	Level of specific academic knowledge in subject area instructed
Metacognitive	Comprehension monitoring (planning; monitoring effectiveness of attempted actions and outcomes of actions; testing, revising, and evaluating learning strategies)
Psychomotor	Psychomotor skills specific to area instructed

Table 2

Classification of the 270 Reviews and Syntheses Used in the Content Analyses and Meta-Analyses

Disciplinary Orientation of Reviews	State and District Governance and Organization	Home & Community Educational Contexts	School Demographics, Culture, Climate, Policies, and Practices	Design and Delivery of Curriculum and Instruction	Student Characteristics	Total Number of Studies	Percent of Studies
Political Science/Policy	14	3	8	4	0	30	11.0
Sociological/Anthropological	1	6	5	0	2	15	5.5
Psychological: General	3	3	4	37	14	84	31.0
Psychological: Cognitive	1	2	0	25	47	93	34.0
Psychological: Behaviorist	0	0	0	6	1	13	5.0
Multidisciplinary*	4	0	5	25	0	35	13.0
Total Number of Studies	23	14	22	97	64	270	100.0
Percent of Studies	9.0	5.0	8.0	36.0	24.0	100.0	

* Examples of studies classified as multidisciplinary include curriculum studies and compendiums of results of educational studies (e.g., What Works, 1986).

Table 3
Average T-Scores for each of the Six Theoretical Constructs

Theoretical Construct	Average T-Score
Student Characteristics	54.7
Classroom Practices	53.3
Home and Community Educational Contexts	51.4
Design and Delivery of Curriculum and Instruction	47.3
School Demographics, Culture, Climate, Policies, and Practices	45.1
State and District Governance and Organization	35.0

Table 4

T-Scores, Average T-Scores, and Number of Sources and Statistical Relationships by Category for the Content Analyses, Expert Ratings, and Meta-Analyses (Ordered from Greatest to Least Average T-Scores)

Category	Content Ratings	Expert Ratings*	Meta-Analyses	Average	Number of Sources in Content Ratings	Number of Statistical Relationships in Meta-Analyses
Classroom Management	59.5	64.9	70.0	64.8	42	15
Metacognitive	60.0	68.0	61.1	63.0	76	186
Cognitive	55.5	58.1	70.2	61.3	101	825
Home Environment and Parental Support	51.9	62.1	61.3	58.4	47	92
Student and Teacher Social Interactions	57.3	56.1	**	56.7	44	**
Social and Behavioral	55.5	55.0	**	55.2	35	**
Motivation and Affective	53.3	64.9	46.2	54.8	81	899
Peer Group	56.4	56.1	49.3	53.9	18	122
Quantity of Instruction	57.3	50.2	53.7	53.7	69	168
School Culture	49.2	57.7	52.8	53.3	49	185
Classroom Climate	56.8	54.2	45.9	52.3	75	734
Classroom Instructional	49.7	59.3	47.2	52.1	156	4095
Curriculum Design	51.0	51.0	52.0	51.3	97	752
Student and Teacher Academic Interactions	51.5	41.9	59.3	50.9	29	14
Classroom Assessment	51.5	52.6	47.3	50.4	61	45
Community	47.4	50.6	**	49.0	15	**
Psychomotor	71.2	36.3	39.3	48.9	6	637
Teacher/Administrator Decision Making	40.7	56.1	**	48.4	21	**
Curriculum and Instruction	52.8	44.3	46.0	47.7	108	1001

Table 4 (continued)

T-Scores, Average T-Scores, and Number of Sources and Statistical Relationships by Category for the Content Analyses, Expert Ratings, and Meta-Analyses (Ordered from Greatest to Least Average T-Scores)

Category	Content Ratings	Expert Ratings*	Meta-Analyses	Average	Number of Sources in Content Ratings	Number of Statistical Relationships in Meta-Analyses
Parental Involvement Policy	41.6	43.1	52.6	45.8	23	1
Classroom Implementation Support	49.2	48.6	39.3	45.7	66	27
Student Demographics	43.0	41.1	50.4	44.8	90	904
Student Use of Out of School Time	53.7	46.6	32.6	44.3	17	274
Program Demographics	55.1	39.5	33.9	42.8	23	725
School Demographics	44.8	36.3	43.0	41.4	25	491
State and District Policies	22.4	32.8	56.0	37.0	19	22
School Policy and Organization	29.5	39.1	40.8	36.5	74	120
District Demographics	32.2	33.6	**	32.9	14	**
Accessibility	***	***	***	***	***	***
History of Educational Placement	***	***	***	***	***	***

* There were 61 respondents who rated each of the 30 categories
** Data were unavailable for these categories; in analyses, they were coded as missing data.
*** The Accessibility and History of Educational Placement categories were removed prior to computation of the T-Scores.

The National Center on Education in the Inner Cities

The National Center on Education in the Inner Cities (CEIC) was established on November 1, 1990 by the Temple University Center for Research in Human Development and Education (CRHDE) in collaboration with the University of Illinois at Chicago and the University of Houston. CEIC is guided by a mission to conduct a program of research and development that seeks to improve the capacity for education in the inner cities.

A major premise of the work of CEIC is that the challenges facing today's children, youth, and families stem from a variety of political and health pressures; their solutions are by nature complex and require long-term programs of study that apply knowledge and expertise from many disciplines and professions. While not forgetting for a moment the risks, complexity, and history of the urban plight, CEIC aims to build on the resilience and "positives" of inner-city life in a program of research and development that takes bold steps to address the question, "What conditions are required to cause massive improvements in the learning and achievement of children and youth in this nation's inner cities?" This question provides the framework for the intersection of various CEIC projects/studies into a coherent program of research and development.

Grounded in theory, research, and practical know-how, the interdisciplinary teams of CEIC researchers engage in studies of exemplary practices as well as primary research that includes longitudinal studies and field-based experiments. CEIC is organized into four programs: three research and development programs and a program for dissemination and utilization. The first research and development program focuses on the *family* as an agent in the education process; the second concentrates on the *school* and factors that foster student resilience and learning success; the third addresses the *community* and its relevance to improving educational outcomes in inner cities. The focus of the *dissemination and utilization* program is not only to ensure that CEIC's findings are known, but also to create a crucible in which the Center's work is shaped by feedback from the field to maximize its usefulness in promoting the educational success of inner-city children, youth, and families.

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